

## THE STATUS OF THE INDO-WEST PACIFIC CARDINALFISHES *APOGON AROUBIENSIS* AND *A. NIGROFASCIATUS*

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*Abstract.* — *Apogon aroubiensis* Hombron and Jacquinot (1853) from Malaysia was named from a single 6 cm specimen which is not extant. It was described and illustrated as having four closely spaced black stripes on the side of the body and 12 pectoral fin rays. This nominal species cannot be equated to any apogonid fish known today. The species of *Apogon* most authors have identified as *A. aroubiensis* is *A. nigrofasciatus* Lachner which is known from the Red Sea and the western Pacific to French Polynesia. It is characterized as follows: five broad uniform dark brown stripes on body, the midlateral stripe ending in a dark spot at caudal base; no narrow short stripe extending posteriorly from upper margin of orbit; pectoral rays 14; gill rakers 20-24; least bony width of interorbital space 5.25-6.0 in head; last anal-fin ray not elongate, its length 2.55-4.0 in head. *Apogon nigrofasciatus* has been confused with *A. angustatus* (Smith and Radcliffe), *A. cookii* Macleay, *A. fasciatus* (Shaw), *A. novemfasciatus* Cuvier, and *A. taeniophorus* Regan. These five valid dark-striped species are differentiated from it in our discussion.

*Apogon aroubiensis* was described by Hombron and Jacquinot (1853:31, pl. 1, fig. 1) from a single specimen nearly 6 cm in length collected at Aroub, Malaysia. The color was given as silvery green with four black stripes; the fins were green with a broad brown border; the pectoral fin ray count was 12. Their illustration, reproduced herein as Fig. 1, shows the four black stripes closely spaced on the side of the body with no stripe dorsally or ventrally; very broad dark margins are evident on the second dorsal, anal, caudal, and pelvic fins.

Jordan and Seale (1906:241, fig. 35) recorded a dark-striped species of cardinalfish from Apia and Pago Pago in the Samoa Islands as *Amia aroubiensis*. However, it is clearly different from the *A. aroubiensis* of Hombron and Jacquinot. The illustration of the Samoan fish shows five black stripes—three broad ones on the side and a narrow one dorsally and ventrally; there are no dark borders on any fins.

Radcliffe (1911:250, pl. 22, upper figure) recorded 125 specimens of the same cardinalfish as that of Jordan and Seale as *Amia aroubiensis* from 50 localities in the Philippines and Celebes collected by the U.S. Bureau of Fisheries steamer *Albatross* in 1908 and 1909. He placed *Apogon fasciatus*, as identified in *Fische der Südsee* by Günther (1873:19), in part, in the synonymy of *A. aroubiensis*, specifically citing the broad-striped "variety" of figure A of Günther's plate 20. He pointed out that the true *Apogon fasciatus* is the fish described by White (1790:268, fig. 1) (actually Shaw in White) from Port Jackson (now Sydney), New South Wales. Since Shaw's type has not been found, Lachner (1953:439, pl. 35 A) designated a neotype (USNM 59972, 80.5 mm SL) collected at "Port Jackson" by D. G. Stead. Radcliffe (1911:249) had already provided a description of this fish and illustrated it on pl. 22 (lower figure, though obviously retouched).



Fig. 1. Holotype of *Apogon aroubiensis*, Aroub, Malaysia (after Hombron and Jacquinot 1853).

Günther (1873) included *Apogon fasciatus* Quoy and Gaimard (1825:344) in his synonymy; however, this is a secondary homonym of *Apogon fasciatus* (Shaw). We have examined the holotype of Quoy and Gaimard's *A. fasciatus* (MNHN 853, 54 mm SL); it is a specimen of *A. novemfasciatus* Cuvier (in Cuvier and Valenciennes, 1828).

McCulloch (1915:118) reported two specimens as *Amia fasciata aroubiensis* from Murray Island, Torres Strait and one from Suva, Fiji. He was followed by Marshall (1964:127).

Fowler (1928:157) used the name *Amia aroubiensis* for what he believed to be the same species as Jordan and Seale (1906), listing their reference in his synonymy, and recording Bishop Museum specimens from Tubuai, Nuku Hiva, and Raiatea.

Weber and de Beaufort (1929:302) erroneously placed *A. aroubiensis* in the synonymy of *A. novemfasciatus* Cuvier.

Fowler and Bean (1930:53) reported on the same material from the Philippines and East Indies as Radcliffe; they listed the 104 lots by *Albatross* collection number, locality, date, and gave the lengths of the specimens.

In his treatment of the fishes of the Phoenix and Samoan Islands, Schultz (1943:95) cited the Jordan and Seale reference and one lot of their material as *Apogon aroubiensis*; he recorded an additional specimen from Tutuila.

Lachner (1953:466) described *Apogon nigrofasciatus* from 132 specimens in 26 lots from the Marshall Islands, seven specimens from Guam, five from Western Samoa, and one from Tubuai, Austral Islands. He distinguished his new species from what he regarded as its closest relative, *A. aroubiensis*, principally by its narrower dark stripes.

Randall (1955:71) recorded 17 specimens of *A. nigrofasciatus* from Onotoa, Gilbert

Islands (Kiribati). Noting the similarity to *A. aroubiensis* as defined by Lachner, he wrote, "It is possible that these two forms are merely subspecies of one wide-ranging species."

In 1978 the senior author noticed the discrepancy in color pattern of the illustration and description of *A. aroubiensis* by Hombron and Jacquinot and the fish the above authors have identified as this species. He wrote M. L. Bauchot of the Muséum National d'Histoire Naturelle to request a loan of the holotype of *A. aroubiensis* if extant. She sent a specimen of what was listed as the type, but it proved to be *A. kallopterus* Bleeker, a very different species of cardinalfish. Clearly an error had been made and another fish substituted for the type. Much searching by Bauchot and associates failed to yield the true type of *A. aroubiensis*, and it must be presumed lost.

There is little chance that *A. aroubiensis* Hombron and Jacquinot is the same as the species later authors identified with this name. Not only is the color pattern different, but the pectoral-fin ray count of 12 given by Hombron and Jacquinot does not match the count of 14 that is consistently found in *A. nigrofasciatus*. These authors gave a count of 12 for the pectoral-fin rays of another species of *Apogon* they described as new, *Apogon nigromaculatus*. This nominal species is now regarded as a synonym of *Sphaeramia orbicularis* (Cuvier) which has 12 pectoral-fin rays. It might also be mentioned that the misnamed *A. aroubiensis* is a clear-water fish usually found on well-developed coral reefs, hence a Malaysian locality for it would not be expected. It therefore seems more likely that the true *A. aroubiensis* is a valid species that has not been correctly reported since the original description in 1853. Nevertheless, we recommend that it be regarded as a doubtful species until material which conforms to the original description and figure is found.

Recent collections of fishes in the western Pacific have failed to yield any broad-striped

specimens of the species that has been misidentified as *A. aroubiensis*, but numerous lots of *A. nigrofasciatus* have been taken from the Philippines, New Guinea, and Indonesia, largely by Victor G. Springer and associates of the National Museum of Natural History. It would seem that *A. nigrofasciatus* has completely replaced the once abundant *A. "aroubiensis."* A close examination of the color pattern of recent material of *A. nigrofasciatus*, however, has revealed that the pale interspaces have a slight dark pigmentation in a zone next to the adjacent dark stripe on each side. We now conclude that specimens initially preserved in alcohol, as was the *Albatross* material from the Philippines and East Indies, maintain the full dark pigmentation of the stripes in preservative, whereas specimens placed in formalin largely lose the dark edges of the stripes, thus giving a pattern of dark and light bands of about equal width.

We present below a description of *A. nigrofasciatus*, followed by discussion of related or confused species and distribution. Key characters to many of the species of the dark striped "*A. fasciatus*" group are given in Radcliffe (1911) and Lachner (1953). Proportional measurements based on more than 30 specimens are rounded to the nearest 0.05.

Specimens examined are deposited in the Australian Museum, Sydney (AMS); British Museum (Natural History), London [BM(NH)]; Bernice P. Bishop Museum, Honolulu (BPBM); Muséum National d'Histoire Naturelle, Paris (MNHN); J. L. B. Smith Institute of Ichthyology, Grahams-town (RUSI); and National Museum of Natural History, Washington, D.C. (USNM). The lengths given of specimens in Material Examined are standard lengths (SL) in millimeters.

*Apogon nigrofasciatus* Lachner  
Figs. 2, 3

*Apogon nigrofasciatus* Lachner, in Schultz and collaborators, 1953:440, 446, fig. 81,





Fig. 2. *Apogon nigrofasciatus*, BPBM 8003, 51 mm SL, Enewetak, Marshall Islands.

pl. 37, D, E (type locality, Bikini, Marshall Islands).

**Description.**—Dorsal-fin rays VII-I,9; anal-fin rays II,8; pectoral-fin rays 14 (rarely 13); lateral line complete, the pored scales 24 or 25 (usually 25) (3 additional pored scales posterior to base of hypural plate); gill rakers 20 to 24 ( $\bar{x}$  = 21.6); mouth terminal, oblique, the maxilla reaching to or slightly beyond a vertical through posterior edge of pupil; a broad band of villiform teeth in jaws, and a narrow band on vomer and palatines; anterior preopercular margin smooth; posterior preopercular margin serrate (the edge with a series of close-set, small spinules); margin of subopercle smooth; body depth 2.7–3.1 in SL; head length 2.4–2.55 in SL; least bony width of interorbital space 5.25–6.0 in head; first dorsal spine very small, about 20 to 35% length of second dorsal spine, which in turn is about 35 to 50% length of third dorsal spine; third dorsal spine 1.85–2.1 in head; first dorsal

soft ray longest, 1.35–1.6 in head; last anal-fin ray not prolonged, its length 2.55–4.0 in SL; caudal fin slightly forked, lobes rounded; pectoral fins 1.45–1.7 in head; pelvic fins reaching beyond anus, sometimes to or slightly posterior to origin of anal fin, longest ray 1.6–1.75 in head. Color in alcohol: pale brown with five uniform dark brown stripes, first narrow, middorsal on nape and along base of dorsal fins, extending broadly onto base of second dorsal fin except for last ray; second dark stripe beginning narrowly on dorsal part of snout, passing along upper edge of eye, enclosing anterior part of lateral line, and ending at upper base of caudal fin; third dark stripe from side of snout, through eye, along center of side of body to mid-caudal base where it is slightly enlarged and darker, thus appearing as an elliptical spot within stripe; fourth stripe from side of maxilla, along lower edge of eye, enclosing pectoral base, and passing to lower caudal fin base; fifth stripe narrow (often faint in preservative), passing from mandible



Fig. 3. Underwater photo of *Apogon nigrofasciatus* taken in the Red Sea off Jeddah, Saudi Arabia.

through pelvic fin base, along lower abdomen, and ending as a band basally in anal fin; second to fourth dark stripes as broad or broader than pale interspaces (distinctly broader if initial preservative was alcohol); ends of second and fourth stripes may converge slightly toward posterior end of midlateral stripe on caudal base, or even join with it (but not extending out onto fin); some dusky pigment anteriorly and basally in spinous dorsal fin; dark stripe at base of second dorsal and anal fins, that of dorsal not set off from base by unpigmented band, except narrow clear zone on last one or two membranes (dark basal band of second dorsal and anal fins more heavily pigmented on mature males than females); faint dusky midlateral streak on caudal fin. In life dark stripes are dark brown to black, suffused with red, lower stripe and anterior part of third and fourth stripes often mainly red;

slight enlargement and intensification of black pigment to form spot at caudal fin base at end of midlateral body stripe; another darker area within fourth dark stripe anterior to pectoral fin base; pale interspaces white, sometimes pale yellowish or greenish yellow; edges of fin spines and rays light red, membranes clear (except where noted above as dusky or black).

*Remarks.* — *Apogon nigrofasciatus* is mainly a coral reef inhabitant. It has been taken in the depth range of 1 to 45 m. It rarely occurs in less than 2 meters, however.

Based on available material, this species exhibits a disjunct distribution. It is found throughout the islands of Oceania except the Hawaiian Islands, Easter Island, the Pitcairn Group, and the Marquesas. (The Bishop Museum specimen from Nuku Hiva reported by Fowler, 1928, as *Amia aroubiensis* has been lost. Extensive rotenone collec-



Table 1.—Gill-raker counts of four dark-striped species of *Apogon*.

	17	18	19	20	21	22	23	24
<i>A. angustatus</i>			14	26	6	1		
<i>A. cookii</i>	17	32	33	3				
<i>A. nigrofasciatus</i> , Marshall Islands					4	18	21	3
Other Pacific localities				7	36	48	17	1
Red Sea and Gulf of Aden					3	18	27	6
<i>A. taeniophorus</i>	21	43	41					

tions by the senior author and associates in these islands failed to yield any *A. nigrofasciatus*.) In the western Pacific, *A. nigrofasciatus* ranges from Wakayama Prefecture, Honshu (Masuda et al. 1975) to the Capricorn Group of the southern Great Barrier Reef (Russell 1983). It probably occurs throughout Indonesia and New Guinea. It has been reported (as *Apogon* sp.) by Allen and Steene (1979) from Christmas Island in the eastern Indian Ocean. It is unknown from the rest of the Indian Ocean but is present in the Red Sea where it is among the more common apogonids on coral reefs.

The largest specimen of *A. nigrofasciatus* examined, USNM 142290, from Bikini, measures 73 mm SL.

Lachner (1953:470) noted that *A. nigrofasciatus* from islands in Oceania attains a larger average size than individuals from the East Indies and Philippines. This is still apparent from the additional material we have examined. He also found that the gill-raker counts were higher in the Marshall Islands than in the Philippines. Our additional counts reveal Marshall Island material typically higher than all other Pacific localities combined, though the two sets of counts are broadly overlapping (Table 1). We found no difference between the counts of specimens from western Pacific localities and those of islands of Oceania other than the Marshalls, and have combined these two sets of data. Specimens of *A. nigrofasciatus* from the Red Sea also show higher gill-raker counts than those from Pacific localities other than the Marshall Islands.

*Apogon nigrofasciatus* has been confused by some authors with *A. novemfasciatus* Cuvier. The latter, however, is easily distinguished by two sectors of its midlateral stripe which are darker and slightly enlarged—one behind the gill opening and one in the middle of the body. Also the second and fourth stripes converge toward the midlateral stripe well out on the caudal fin (see Jordan and Seale 1906: fig.36).

The three dark-striped, Indo-Pacific species most often confused with *A. nigrofasciatus* are: *A. cookii* Macleay (1881), of which *A. melanotaenia* Regan (1905) and *A. robustus* (Smith and Radcliffe in Radcliffe, 1911) are junior synonyms; and *A. angustatus* (Smith and Radcliffe in Radcliffe, 1911); and *A. taeniophorus* Regan (1908), of which *A. fasciata stevensi* (McCulloch, 1915) and *A. saipanensis* (Fowler, 1945) are junior synonyms.

Fowler was unable to locate the type specimens of his *Lovamia saipanensis* for Lachner, so the latter regarded it as a valid species (Lachner 1953:439). Fraser (in Böhlke 1984), however, placed it in the synonymy of *A. novemfasciatus*. Except for a diagonal dark stripe on the abdomen (which Fowler attributed to the blackish peritoneum showing through the body wall), the color pattern of Fowler's figure of *A. saipanensis* resembles *A. taeniophorus*, not *A. novemfasciatus*. The second and fourth dark stripes do not converge on the caudal fin and the midlateral stripe is uniform in width and pigmentation. We made counts of 14 pectoral rays and 18 for the gill rakers of the holotype of



Fig. 4. *Apogon cookii*, BPBM 20834, 75 mm SL, Gulf of Aqaba, Red Sea.

*A. saipanensis*. On the basis of the color pattern and these counts we place *A. saipanensis* in the synonymy of *A. taeniophorus*.

*Apogon cookii* (Fig. 4) may be distinguished from *A. nigrofasciatus* by nearly always having 15 pectoral rays (Fraser 1974, Table 1), by its lower gill-raker counts (Table 1 herein), its broader interorbital space (bony width 4.15–5.1 in head, compared to 5.25–6.0 for *A. nigrofasciatus*), and in color. Adults have a narrow dark stripe extending posteriorly from the upper edge of the orbit, often to below the second dorsal fin. Also the dark band in the second dorsal fin is separated from the base by a narrow whitish band. Grant (1982: pl. 130) illustrated *A. cookii* in color (as *A. novemfasciatus*). This species occurs in very shallow water, generally less than 2 m. Although usually found on rocky substrata, as under ledges in tide-

pools, it may also be seen in seagrass beds or around small coral heads.

*Apogon taeniophorus* (Fig. 5) has the same pectoral-ray count of 14 as *A. nigrofasciatus*; however, it is completely separable by its low gill-raker counts (Table 1). It also has a broad interorbital space, the least bony width 4.5–5.35 in head. It is very similar in color to *A. cookii*, differing in lacking a distinct dark spot in the midlateral stripe at the caudal fin base. Its spot, if it can be distinguished at all, is elliptical, only slightly broader than the stripe, and at best slightly darker. By contrast, the caudal base spot of *A. cookii* is distinctly larger than the stripe width, round or nearly round, and darker than the stripe. The narrow dark stripe extending posteriorly from the upper orbit is not as well developed as on *A. cookii*. *Apogon taeniophorus* is also a species of shallow water of variable habitat from surge chan-



Fig. 5. *Apogon taeniophorus*, BPBM 16045, 58 mm SL, Guadalcanal, Solomon Islands.

nels of exposed reefs to rock or debris in mud-bottom harbors.

*Apogon angustatus* (Fig. 6) usually has 14 pectoral rays. Its gill-raker counts are lower than those of *A. nigrofasciatus* but do not provide complete separation (Table 1). The last anal rays of this species are elongate, thus the distal border of the fin is distinctly concave; the length of the last anal ray is contained 1.75–2.65 times in the head length, compared to 2.55–3.8 for *A. nigrofasciatus*. The dark stripes of *A. angustatus* are narrower than the whitish interspaces; they are blackish at Indian Ocean localities and yellowish brown at islands of Oceania (on these Pacific fish the black spot at the caudal fin base is therefore more conspicuous). *Apogon angustatus* has been collected on coral reefs in the depth range of 6 to 40 meters.

Mention should be made of *Apogon fasciatus* (Shaw) since some authors have placed *A. arobiensis* in the synonymy of, or as a subspecies of this species. *Apogon fasciatus*

is now regarded as a senior synonym of *A. quadrifasciatus* Cuvier. It has the short post-ocular dark stripe from the upper edge of the orbit as in *A. cookii* and *A. taeniophorus*, but lacks a well developed dark stripe below the midlateral stripe (though this was mistakenly added to the illustration in Radcliffe 1911: pl. 22). The anus is black. The gill rakers range from 18–22; the neotype has 22.

*Material examined.*—*Apogon angustatus*: In addition to the holotype of *Amia angustata* Smith and Radcliffe, we have examined USNM material from Borneo and the Trobriand Islands, and two MNHN and 40 BPBM specimens, 21–78 mm, from the Pitcairn Group, Tuamotu Archipelago, Society Islands, Line Islands, Palau Islands, New Caledonia, New Guinea, Seychelles, and Mauritius. Also we have examined ten RUSI specimens from Natal, 23–63 mm.

*Apogon cookii*: We have examined the syntypes of *Apogon cookii* Macleay (AMS I.16307-001, 6: 35.5–63) from the Endeav-





Fig. 6. *Apogon angustatus*, BPBM 6946, 71 mm SL, Tahiti, Society Islands.

or River, northern Queensland and the holotype of *Apogon robustus* (Smith and Radcliffe) from Jolo, Philippines. Also 100 BPBM and USNM specimens from the following major localities: New Caledonia, Great Barrier Reef, Taiwan, Western Australia, SE India, Seychelles, Natal, Tanzania, Kenya, and the Red Sea.

*Apogon nigrofasciatus*: In addition to the type specimens as listed by Lachner (1953) and the USNM material given by *Albatross* field numbers in Fowler and Bean (1930), we have examined specimens from the following localities: TUAMOTU ARCHIPELAGO: Mangareva, BPBM 13558, 2: 49–56.8 mm. Rangiroa, BPBM 10258, 48 mm; BPBM 25224, 57.2 mm. SOCIETY ISLANDS: Tahiti, BPBM 10283, 2: 26–54.2 mm. Moorea, MNHN 1984-118, 3: 32.2–52.5 mm; BPBM 11969, 7: 40.5–53 mm. Raiatea, BPBM 1674, 48 mm; BPBM 1675, 46 mm. RAPA: BPBM 17268, 2: 55.7–69.6 mm. AUSTRAL ISLANDS: Tubuai, BPBM 794, 65 mm; BPBM 795, 62 mm. COOK ISLANDS: Aitutaki, BPBM 5612, 11: 33–

52.1 mm. FIJI: Viti Levu, USNM 176632, 2: 54–59 mm. VANUATU (NEW HEBRIDES): Espiritu Santo, USNM 262508, 2: 37–47 mm. Efate, BPBM 5615, 55.5 mm. LOYALTY ISLANDS: Uvéa, BPBM 27071, 61.4 mm. NEW CALEDONIA: BPBM 11466, 46.2 mm. GREAT BARRIER REEF: Hook Island, BPBM 15556, 4: 33.4–51 mm. Yonge Reef, MNHN 1978-588, 51 mm. SOLOMON ISLANDS: Guadalcanal, BPBM 5695, 41 mm; BPBM 15578, 2: 29–34.2 mm; BPBM 16157, 3: 32.5–41 mm; USNM 262511, 46 mm. NEW IRELAND: USNM uncat., 17: 32–48 mm. NEW GUINEA: Bagabag Island, USNM 262709, 31: 18–52 mm. Massas Island, BPBM 262612, 6: 19–48.5 mm. Louisiade Archipelago, USNM 262710, 36: 30–59 mm. Madang, BPBM 15761, 44.2 mm. Ninigo Islands, BPBM 30345, 29: 31.2–46.8 mm; USNM 262426, 15: 16–49 mm. Hermit Islands, USNM 261037, 32: 20–29.5 mm. INDONESIA: Ambon, BPBM 19312, 3: 35–53.7 mm. Banda Islands, USNM 262706, 13: 29–42 mm. Kai Islands, USNM

262704, 12: 30–47 mm. Bali, BPBM 30181, 3: 42.5–49 mm. PHILIPPINES: Siquijor Island, BPBM 30210, 29: 31.2–46.8 mm; USNM 260967, 75: 15–49 mm. Apo Island, BPBM 30344, 24: 28.7–48 mm; USNM 262375, 3: 42–51.5 mm. Palawan, USNM 262369, 17: 38–46 mm. Negros, BPBM 28585, 2: 49–51.5 mm; BPBM 30343, 67: 29–48.9 mm; USNM 262366, 16: 13.5–48 mm. Balicasag Island, USNM 260963, 19: 32–51 mm. Cebu, USNM 262383, 15: 13.5–47 mm. Mactan Island, USNM 262374, 10: 24–48 mm. TAIWAN: BPBM 23302, 33 mm; BPBM 23369, 36.5 mm. RYUKYU ISLANDS: Ishigaki, BPBM 8697, 5: 45–64.5 mm. PALAU ISLANDS (BELAU): BPBM 7423, 60.6 mm; BPBM 9808, 2: 44–47 mm. CAROLINE ISLANDS: Truk, BPBM 9062, 42.2 mm. MARSHALL ISLANDS: Enewetak, BPBM 8003, 5: 49–63 mm; BPBM 8220, 44.2 mm; BPBM 8254, 2: 56–56.2 mm; BPBM 8256, 4: 44.5–59.3 mm; BPBM 8288, 54.5 mm; BPBM 29142, 15: 38.5–71 mm. GULF OF ADEN: MNHN 1977-639, 4: 48.5–52 mm; MNHN 1977-642, 57 mm; MNHN 1977-643, 54 mm. RED SEA: MNHN 1952-95, 52 mm. Gulf of Aqaba, BPBM 13397, 3: 35–52.2 mm; BPBM 18370, 3: 51.3–65 mm; MNHN 1977-815, 62 mm; MNHN 1977-816, 52.5 mm; USNM 212777, 12: 37.7–61 mm; USNM 212782, 21: 17.0–62 mm; USNM 213612: 35 mm.

*Apogon taeniophorus*: We have examined the syntypes of *A. taeniophorus* Regan from the Maldives BM(NH) 1908.3.23.90–92, 3: 43–77 mm SL, and the holotype of *A. saipanensis* (Fowler) from the Marianas (ANSP 71588, 22 mm SL). In addition, we have seen specimens listed by Lachner (1953) from the Marshall Islands and Marianas as *Apogon robustus*, and 128 BPBM specimens, 19–92.5 mm, from the following major localities: Pitcairn Group, Society Islands, Austral Islands, Rapa, Cook Islands, Line Islands, Gilbert Islands (Kiribati), Marshall Islands, Minami Tori Shima (Marcus Island), Taiwan, Indonesia, Fiji,

Solomon Islands, New Britain, SW Thailand, SW India, Seychelles, Tanzania, Natal, Gulf of Aden, and the Red Sea.

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